

Air Quality Criteria for Particulate
Matter and Sulfur Oxides (1986)
Review of the Second Addendum

(U.S.) Environmental Protection Agency
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

December 15, 1986

OFFICE OF
THE ADMINISTRATOR

The Honorable Lee M. Thomas
Administrator
U.S. Environmental Protection
Agency
Washington, DC 20460

Dear Mr. Thomas:

The Clean Air Scientific Advisory Committee (CASAC) has completed its review of two documents related to the development of National Ambient Air Quality Standards (NAAQS) for Particulate Matter and Sulfur Oxides. These two documents are the 1982 Air Quality Criteria for Particulate Matter and Sulfur Oxides, and the 1986 Second Addendum to Air Quality Criteria for Particulate Matter and Sulfur Oxides (1982), both prepared by the Agency's Environmental Criteria and Assessment Office (ECAO).

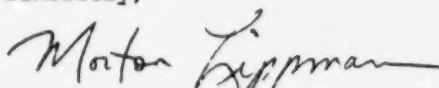
The Committee was impressed with the efforts of the staff of ECAO in preparing a well written, integrated and thorough review of recent relevant scientific studies. The Committee unanimously concluded that this 1986 Addendum, along with the 1982 Criteria Document previously reviewed by CASAC, represent a scientifically balanced and defensible summary of the extensive scientific literature on these pollutants.

Several important issues are discussed in the 1986 Addendum which the Committee believes should be emphasized. These issues were raised during our review of recent studies which relate primarily to guidance at the lower bounds of the ranges for the standards. These studies include the recent reanalyses of the London mortality data, two episodic lung function studies in the United States and the Netherlands, and the comparison of respiratory symptoms and pulmonary function levels of children living in six U.S. cities. Further discussion of these studies and reanalyses, as well as a more detailed discussion of the basis for the Committee's conclusions, are contained in the attached report.

The Committee also reviewed the Staff Papers for particulate matter and for sulfur oxides at the October 15-16, 1986 meeting, and is preparing separate reports reflecting its conclusions and recommendations on each of these two documents.

Thank you for the opportunity to present the Committee's views on these important public health issues.

Sincerely,

A handwritten signature in dark ink, appearing to read "Morton Lippmann", with a long horizontal flourish extending to the right.

Morton Lippmann, Ph.D.

Chairman

Clean Air Scientific Advisory
Committee

cc: A. James Barnes
Lester Grant
Vaun Newill
Craig Potter
Terry Yosie

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SUMMARY OF MAJOR SCIENTIFIC ISSUES AND CASAC CONCLUSIONS
ON THE 1986 ADDENDUM TO THE 1982
PARTICULATE MATTER/SULFUR OXIDES (PM/SO_x) CRITERIA DOCUMENT

The Committee concentrated its review on newer studies and analyses which relate primarily to guidance on the lower limit of the proposed ranges for the standards. In general, the Committee believes the Criteria Document Addendum has appropriately summarized and interpreted the designs, analyses and conclusions of studies that should be considered in the standard setting process. The following is a brief chapter by chapter summary of issues that the Committee wishes to emphasize, or which require further clarification.

Chapter 1: Introduction

In general, this chapter provides an excellent summary of the physical and chemical properties and ambient measurement methods for PM and SO_x. However, the chapter could be strengthened by inclusion of a discussion of direct reading monitors for particulate mass concentrations including beta attenuation, light scattering, or other techniques which may be the dominant measurement techniques in the States in the future. This was discussed at the December 1985 CASAC meeting, with emphasis on the need to move to automated and continuous monitoring for particles.

Chapter 2: Respiratory Tract Deposition and Fate

The presentation in this chapter could be expanded by clarifying the discussion concerning the concept of impaired lungs and the deposition that would occur there as opposed to that in normal subjects. Further, the discussion of broncho-constriction being protective (Svartengren et al., 1984) and the discussion of other types of altered breathing patterns could be made clearer, perhaps by reorganizing this information by specific points.

Chapter 3: Epidemiology Studies

We wish to emphasize several studies and analyses discussed at the October 1986 CASAC meeting. One of these studies (Dassen et al.) should be integrated into this chapter, as was recognized by Agency staff in their remarks at the October 1986 meeting.

- 1) The two episodic lung function studies show a consistency of results in Steubenville, Ohio (Dockery et al.) and Ijmond, Netherlands (Dassen et al.), lending credence to reported effects of a mixture of PM and sulfur oxides (SO_x) on respiratory function in children. This is consistent with the earlier work of Stebbings. These studies provide a relatively sensitive indication of possible short term physiological responses of uncertain health significance to PM. The roles of exposure times and duration of functional decrement need better definition.

- 2) The London mortality studies, including recent analysis by Agency staff, provide strong evidence that particulate matter is more closely associated with daily mortality than sulfur dioxide concentrations. The criteria document should recharacterize distinctions made between "likely" and "possible" effects levels for establishing upper bounds.
- 3) The Six-Cities study has reported that cough and bronchitis are twice as prevalent in children living in cities with PM_{10} in the range of 40-60 ug/m^3 , in comparison to cities with a range of 20-30 ug/m^3 .

Chapter 4: Controlled Human Exposure Studies of SO_2 Health Effects

Although this chapter was well done, the Committee suggests that it be strengthened by modifying its existing discussions and by addition of further discussion and tabular material concerning short term exposure effects presented by Drs. Horstman and Folinsbee at the October 1986 CASAC meeting.

Conclusion

The 1986 Addendum to the 1982 Air Quality Criteria Document on PM/SO_x was prepared by EPA at the request of CASAC for the purpose of updating the knowledge of recent scientific studies and analyses. The Committee commends the Agency staff for its efforts in preparing a concise and well written document. The Addendum summarizes key findings from the earlier documents and provides a reasonably complete summary of newly available information concerning particulate matter and sulfur oxides, with major emphasis on evaluation of human health studies published since 1981. The Committee unanimously concludes that this 1986 Addendum, with the incorporation of the changes noted above, represents a scientifically balanced and defensible summary of the extensive scientific literature on these pollutants. These documents fulfill the requirements under section 108 of the Clean Air Act as amended, which requires that the document(s) "...shall accurately reflect the latest scientific knowledge useful in indicating the kind and extent of all identifiable effects on public health or welfare..." from particulate matter and sulfur oxides in the ambient air.